

only with the mathematical investigation of the subject; the experimental side is entirely omitted. The attempt to compress into one small table (p. 11) the average values of the tenacity, shearing strength, &c., of the chief materials of construction has led to the insertion of figures likely to mislead the unwary; for example, the tenacity of steel is given as 110,000 lb. per square inch; as a matter of fact, the tenacity of most of the mild steel used in constructional work lies between 60,000 and 70,000 lb. per square inch. Again, the shearing strength of wrought-iron is given as 20,160 lb. per square inch; this is much too low a figure; it is less than half the average value of the shearing strength of wrought-iron rivets and pins in double shear.

Each chapter has a series of examples to illustrate the formulæ which are deduced in that chapter, and the answers are in many cases appended; it is noticeable that these answers have a defect, by no means uncommon in text-books of this class, to which attention has often been directed, and which can best be explained by quoting a specimen answer. The student has to determine from certain data the diameter of a wooden spar used as a beam; the answer appended to the question is 7.0025 inches; of what value are the figures to the right of the decimal point? In a subject like strength of materials, one of the first lessons which the student should learn is that the numerical data which he proposes to use in some mathematical formula may, for obvious reasons, vary by some quite perceptible percentage on either side of a mean value (the value he proposes to use), and that, therefore, he can expect to obtain a solution which is only approximately correct, hence to work out a solution to the degree of accuracy of that in the example quoted above is not only a waste of time, but is positively misleading. It is to be hoped that in any future edition these answers will be revised.

The effect of combination of stresses is dealt with in chapter v. in a clear and simple fashion, and it is refreshing to find this portion of the subject taken up at such an early stage of the work, and its importance impressed upon the student.

The book concludes with a number of miscellaneous problems, such as reinforced concrete beams, stresses in thick cylinders and guns, &c.

The book will probably prove an acceptable one to young engineers who are just beginning the study of this important subject, and want to get a general insight into it before they begin to work at one of the more advanced and complete text-books.

(3) As the author points out, there are numerous elementary text-books on steel structural design, but there has been a distinct want of an elementary work on the design of masonry structures. This book will supply this need, for it explains just those underlying principles which the beginner finds it troublesome to understand.

It is difficult to follow the author's reasoning in chapter i., when deducing the safe compressive load for masonry; surely if it took 900 tons per square foot to crush a specimen of granite, there must have been a shearing stress when rupture occurred (most

probably by shearing) of something like 450 tons per square foot, and, therefore, the method of deducing a safe compressive working stress given on p. 10 is hardly logical.

The branches of masonry design dealt with include walls, piers, brackets, simple arches, vaults and skew arches, domes, and retaining walls and dams; the treatment of each branch is sufficiently complete for all the practical cases the young civil engineer or architect is likely to meet with, all the more complex theories being wisely omitted.

The last chapter deals in brief fashion with reinforced concrete, the essential principles of this system being fully explained.

POPULAR NATURAL HISTORY.

- (1) *Animals and their Ways. An Introduction to the Study of Zoology and Agricultural Science.* By E. Evans. Pp. viii+184. (London: J. M. Dent and Co., 1909.) Price 1s. 4d.
- (2) *The Hedge I Know.* Edited by W. P. Westell and H. E. Turner. Pp. 77. (London: J. M. Dent and Co., 1909.) Price 8d.
- (3) *The Pond I Know.* Edited by the same. Pp. 78. (London: J. M. Dent and Co., 1909.) Price 8d.
- (4) *Butterflies and Moths shown to the Children.* By Janet H. Kelman, described by Rev. Theodore Wood. Pp. xvi+94. (London and Edinburgh: T. C. and E. C. Jack, 1909.) Price 2s. 6d. net.
- (5) *Nests and Eggs shown to the Children.* By A. H. Blaikie, described by J. A. Henderson. Pp. xvi+78. (London and Edinburgh: T. C. and E. C. Jack, 1909.) Price 2s. 6d. net.
- (6) *The Backwoodsmen.* By Charles G. D. Roberts. Pp. 317. (London: Ward, Lock and Co., 1909.) Price 6s.

(1) **ALTHOUGH** the title of this review of the above series of books might lead one to suppose that this book would be a popular account of the lives and habits of animals, it is unfortunately necessary to point out that such an idea would be fallacious. It is a matter of regret that the author should have chosen a title which, to our minds, does not convey a correct idea of the contents. The reason may be that we have been spoilt by the previous publication of one or two excellent little works on animal life, and that our criterion has been raised. Be this as it may, the author has not succeeded in doing justice to his theme, and we cannot imagine any young student being filled with enthusiasm for zoological science, still less agricultural science, after having had this introduction. That the author must be a botanist is evinced by such a word as "Crustaceæ" (p. 170). The illustrations are poor, Fig. 3 being especially crude; and an acknowledgment of the source of such figures as are taken from the publications of the U.S. Department of Agriculture, which are good, should surely be given under the figures, as is customary.

(2 and 3). These small books of the same series are marvellous examples of cheap printing, and are unaccompanied by the usual inferior illustrations; they are well illustrated, and, on the whole, are written in simple language. It probably would have been pre-

ferable to have substituted the description of a stickle-back for that of a pike in the fauna of the pond as being more characteristic. We should think it rather doubtful whether most children (or grown-ups) would identify the frontispiece of the first of these two books as a hedge, nor should we wish the statement on p. 32 of the same book, that the "sap escapes and takes the form of curiously moss-like growths," to be taken as scientifically accurate by the student of natural history.

(4) Who could describe the butterflies to our children better than the Rev. Theodore Wood, who has done so much to popularise natural history among the young? We should expect that he would do it excellently, and are not disappointed in this little book, which is one of the best of the series. With the exception of one or two of the caterpillars, the illustrations are excellent, as is essential in a book of this nature, where a good coloured figure is so important; for no child could identify a butterfly correctly and with ease from the best of written descriptions.

(5) In describing the eggs of birds to the children it is an excellent idea to associate the nests with the eggs. Children do not dissociate the two to the extent that many older persons in the past have been accustomed to do. To a child as yet unspoilt by the collecting fever characteristic of youth, the nest is as important as the eggs it contains, and this small book will serve as an excellent guide to those budding observers to whom the finding of a nest is an object of interest and pleasure.

(6) Strictly speaking, this book, which is a collection of tales of the backwoods of Canada, does not come within our province; nevertheless, the author is so keen an observer of nature, and so well known as an ardent follower of the "call of the wild," that some of his tales are full of life and interest, and form excellent "light reading."

C. GORDON HEWITT.

OUR BOOK SHELF.

Recent Advances in Physical and Inorganic Chemistry. By Dr. A. W. Stewart. With an Introduction by Sir Wm. Ramsay, K.C.B., F.R.S. Pp. xiv+267. (London: Longmans, Green and Co., 1909.) Price 7s. 6d. net.

THE present volume is a companion to the author's book entitled "Recent Advances in Physical Chemistry." The issue of two such books by the same author affords a fair gauge alike of their merits and of their demerits. At the present time, no one writer can possibly be a master of organic, of inorganic, and of physical chemistry, and the criticisms that are offered by the author cannot, therefore, be regarded as having more than a superficial value. On the other hand, the production of a second volume so soon after the publication of the first may be taken as evidence of a considerable popular demand, and shows at least that a book of this type was called for by a wide circle of readers. In the circumstances, it is to be regretted that the publishers did not follow out the plan they have adopted in their excellent "Text-books of Physical Chemistry" and in their "Monographs on Biochemistry" of securing a series of articles by authors who have themselves worked on the subjects which they discuss. A volume compiled on

these lines would have been of real value and undoubted usefulness.

In the present instance the author has rendered a service to the student who is working for an honours degree by presenting in a compact form the main results of certain lines of research which have been carried on in recent years, and may from time to time form the subject of examination questions. These investigations can only be mastered by a toilsome perusal of the original literature, and every attempt to reduce the labour involved in this task is sure of a welcome alike from the student and from the teacher. The danger of all such attempts is that the reader may acquire the indolent habit of obtaining his information in this easy way from second-hand sources, and so lose the stimulus and the opportunity of independent judgment which come from a perusal of the original text. On the whole, however, if the work is adequately carried out, the balance of advantage is in favour of the method of summarised presentation, and as the bulk of chemical literature becomes more and more unwieldy, the production of these summaries will become increasingly important. On these lines, Dr. Stewart's volume may be sure of a welcome and a considerable circulation.

(1) *The Elements of Mechanics of Materials. A Text-book for Students in Engineering Courses.* By C. E. Houghton. Pp. viii+186. (London: Constable and Co., Ltd., 1909.) Price 7s. 6d. net.

(2) *Experimental Mechanics for Schools.* By F. Charles and W. H. Hewitt. Pp. vii+288. (London: G. Bell and Sons, 1909.) Price 3s. 6d.

(1) In this elementary text-book the engineering student is provided with a clear and concise account of the practical applications of mechanical principles to the design of simple machine parts and common structures. The first two chapters deal with the properties of materials as disclosed in the experimental laboratory, and with the strengths of tie-rods, cylinders, and riveted joints. Succeeding chapters relate to the strength and stiffness of beams, shafts, struts, and composite structures, including reinforced beams and columns; there is also an investigation of the effect of combined stresses. The most valuable parts of the book are the excellent collections of review questions and illustrative problems with which each chapter closes. These are very suggestive, well graduated, and eminently practical, and will be greatly appreciated by students and teachers alike. The author writes for those students who have only time for a very cursory study of the theory of elasticity, so that the limitations of the various formulæ are scarcely considered. The book will serve a very useful purpose, and will afford great assistance in some parts of practical design.

(2) Messrs. Charles and Hewitt describe or suggest a large number of simple experiments illustrating the principles of mechanics, and give extensive sets of examples in which these principles are enforced and applied. They constitute a mine from which teachers may select such details as are suitable for their own particular circumstances. The earlier experiments are statical, and deal with forces at a point, parallel forces, and friction, and illustrate the principle of the parallelogram and of the lever. A boy easily understands the action of a force because he employs his muscles every day to exert forces. The actions of couples remain more or less of an abstraction, for he seldom applies them. The authors have overlooked the need there is in the laboratory for the frequent muscular application of torques, measured by angular displacements in a simple torque meter placed between the hand and the apparatus.